Log Event A

Borehole # 10-06-09

Borehole Information

Farm : A	**Tank :** A-106	**Site Number :** 299-E25-69
N-Coord : 41,304	**W-Coord :** 47,651	**TOC Elevation :** 687.00
Water Level, ft : 123.10	**Date Drilled :** 4/30/1962	

Casing Record

Type : Steel-welded	Thickness, in. : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 125	

Cement Bottom, ft. : 130 **Cement Top, ft. :** 125

Borehole Notes:

Borehole 10-06-09 was drilled in April 1962 to a depth of 75 ft with 6-in. casing. Data from the drilling log and Chamness and Merz (1993) were used to provide borehole construction information. In 1964, the casing was extended to a depth of 85 ft. In 1978, the borehole was deepened to 130 ft and the 6-in. casing was extended to a depth of 125 ft. An 18-ft length of temporary 8-in. surface casing was installed before deepening the borehole. The annulus between the 6-in. borehole casing and the 8-in. surface casing was stemmed with grout from 18 ft to the ground surface as the surface casing was removed. The bottom of the borehole was backfilled with grout from 130 to 125 ft. There is no mention that the 6-in. casing was perforated.

"As-built" drawings for the A Tank Farm indicate the original borehole was constructed with 6-in., schedule-30 pipe; however, this type of pipe was not identified. The casing thickness for this borehole is assumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. casing.

The top of the casing is the zero reference for the log. The casing lip is approximately even with the ground surface.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 10/1996	**Calibration Reference :** GJO-HAN-13	**Logging Procedure :** P-GJPO-1783

Logging Information

Log Run Number : 1	**Log Run Date :** 10/26/1996	**Logging Engineer:** Alan Pearson
Start Depth, ft.: 0.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 4.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Log Run Number :	2	**Log Run Date :**	10/25/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	123.0	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	34.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Log Run Number :	3	**Log Run Date :**	10/24/1996	**Logging Engineer:**	Alan Pearson
Start Depth, ft.:	35.0	**Counting Time, sec.:**	100	**L/R :** L **Shield :**	N
Finish Depth, ft. :	3.0	**MSA Interval, ft. :**	0.5	**Log Speed, ft/min.:**	n/a

Logging Operation Notes:

This borehole was logged in three log runs. The total logging depth achieved by the SGLS was 123 ft.

Analysis Information

Analyst : S.D. Barry

Data Processing Reference : MAC-VZCP 1.7.9 Analysis Date : 03/12/1998

Analysis Notes :

The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from these spectra were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during the logging operation.

A casing correction factor for a 0.280-in.-thick steel casing was applied to the spectral peak intensity data during the analysis process.

Shape factor analysis was applied to the SGLS data and provided insights into the distribution of Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.

A plot of the shape factor analysis results is also included. The plot is used to help determine the radial

distribution of man-made contaminants around the borehole.

Results/Interpretations:

The only man-made radionuclide detected in this borehole was Cs-137. Cs-137 contamination was detected nearly continuously from the ground surface to a depth of 25 ft, intermittently just above the MDL from 26 to 117 ft, and continuously from 120.5 ft to the bottom of the logged interval (123 ft).

The K-40 log plot shows an interval of decreased concentrations from 8 to 13 ft. At 105 ft, the K-40 concentration values increase from about 13 to 16 pCi/g. Also at about 105 ft, the Th-232 concentrations increase.

An analysis of the shape factors associated with applicable segments of the spectra was performed. The shape factors provide insights into the distribution of the Cs-137 contamination and into the nature of zones of elevated total count gamma-ray activity not attributable to gamma-emitting radionuclides. The shape factor analysis for the interval from the ground surface to about 17 ft is not valid because of the presence of grout on the outside of the borehole casing.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Reports for tanks A-105 and A-106.